

**Supplemental table 1: Baseline characteristics by cardiac and orthopedic diagnosis**

|                                       | <b>Cardiac<br/>(n=73)</b> | <b>Orthopedic<br/>(n=49)</b> |
|---------------------------------------|---------------------------|------------------------------|
| Age, years                            | 55.3 ± 8.4                | 56.2 ± 7.0                   |
| Height, cm                            | 166.5 ± 6.7               | 162.6 ± 7.4                  |
| Weight, kg                            | 98.9 ± 22.4               | 96.4 ± 19.6                  |
| BMI, kg/m <sup>2</sup>                | 35.4 ± 6.3                | 36.3 ± 6.5                   |
| Female, n (%)                         | 8 (11)                    | 23 (46.9)                    |
| <b>Cardiac diagnosis, n (%)</b>       |                           |                              |
| Coronary artery disease (CAD)         | 64 (87.7)                 | 4 (8.2)                      |
| w/o hemodynamic stenoses              | 4 (5.5)                   | 0 (0)                        |
| one-vessel disease                    | 20 (27.4)                 | 2 (4.1) §                    |
| two-vessel disease                    | 15 (20.5)                 | 0 (0)                        |
| three-vessel disease                  | 25 (34.2)                 | 0 (0)                        |
| other cardiovascular disease*         | 9 (12.3)                  | 2 (4.1) §                    |
| with LVEF < 45 ml                     | 4 (5.5)                   | 0 (0)                        |
| <b>Orthopedic diagnosis, n (%)</b>    |                           |                              |
| Dorsopathy #                          | 7 (9.6) §                 | 14 (28.6)                    |
| Segmental and somatic dysfunction §   | 0 (0)                     | 18 (36.7)                    |
| Unspecified/chronic pain ¥            | 1 (2.7) §                 | 11 (22.4)                    |
| other orthopedic diagnosis ‡          | 0 (0)                     | 6 (12.2)                     |
| with osteoarthritis                   | 3 (4.1) #                 | 12 (24.5)                    |
| <b>Comorbidities, n (%)</b>           |                           |                              |
| Arterial hypertension                 | 52 (71.2)                 | 28 (57.1)                    |
| Diabetes mellitus                     | 24 (32.9)                 | 7 (14.3)                     |
| Obesity (BMI ≥ 40 kg/m <sup>2</sup> ) | 36 (49.3)                 | 23 (46.9)                    |
| <b>Medication, n (%)</b>              |                           |                              |
| Statins                               | 61 (83.6)                 | 8 (16.3)                     |
| RAAS-inhibitors                       | 62 (84.9)                 | 28 (57.1)                    |
| Diuretics                             | 24 (32.9)                 | 9 (18.4)                     |
| Beta-blocker                          | 58 (79.5)                 | 11 (22.4)                    |

Data are presented as mean ± SD or n (%). BMI: body mass index; LVEF: left ventricular ejection fraction; RAAS: renin-angiotensin-aldosterone-system; \* including angina pectoris, arterial fibrillation; § secondary diagnosis; # including ICD-10: M50-54; § M99.-; ¥ R52.2, R52.9; ‡ M16.-, M17.-, Z96.-.

**Supplemental table 2: Additional variables and changes by study group**

| Variables                            |      | WB-EMS<br>(n=47)  | PB-EMS<br>(n=37)  | Control<br>(n=38) | 3-group<br>comparison<br>( <i>p</i> ) | EMS vs.<br>Control<br>( <i>p</i> ) |
|--------------------------------------|------|-------------------|-------------------|-------------------|---------------------------------------|------------------------------------|
| <b>Strength</b>                      |      |                   |                   |                   |                                       |                                    |
| <b>Knee flexion [N]</b>              | pre  | 215.9 ± 107.2     | 211.3 ± 94.0      | 207.2 ± 105.7     |                                       |                                    |
|                                      | post | 271.6 ± 124.3 *** | 256.3 ± 121.6 **  | 244.2 ± 108.7 *** | .396                                  | .259                               |
|                                      | [%]  | 35.6 ± 43.6       | 25.2 ± 31.9       | 22.7 ± 25.3       |                                       |                                    |
| <b>Arm flexion [N]</b>               | pre  | 455.4 ± 202.0     | 469.8 ± 193.2     | 417.0 ± 173.3     |                                       |                                    |
|                                      | post | 540.6 ± 192.0 *** | 531.2 ± 188.9 *** | 494.0 ± 173.1 *** | .603                                  | .758                               |
|                                      | [%]  | 27.7 ± 40.2       | 18.0 ± 24.8       | 23.7 ± 29.0       |                                       |                                    |
| <b>Trunk flexion [N]</b>             | pre  | 160.7 ± 59.5      | 142.0 ± 47.7      | 140.5 ± 44.6      |                                       |                                    |
|                                      | post | 196.7 ± 110.2 **  | 155.1 ± 48.1 **   | 147.5 ± 44.6      | .082                                  | .115                               |
|                                      | [%]  | 26.4 ± 45.2       | 12.0 ± 24.0       | 8.0 ± 22.5        |                                       |                                    |
| <b>Mean overall strength change</b>  | [%]  | 28.7 ± 19.2       | 17.9 ± 18.8       | 18.4 ± 14.5       | .011                                  | .111                               |
| <b>Body composition</b>              |      |                   |                   |                   |                                       |                                    |
| <b>BMI [kg/cm<sup>2</sup>]</b>       | pre  | 37.1 ± 5.5        | 33.8 ± 5.7        | 36.0 ± 7.6        |                                       |                                    |
|                                      | post | 36.5 ± 5.1 ***    | 33.5 ± 5.5 *      | 35.6 ± 7.1 *      | .789                                  | .567                               |
|                                      | [d]  | -1.6 ± 2.4        | -0.9 ± 2.9        | -0.9 ± 3.0        |                                       |                                    |
| <b>Visceral fat [cm<sup>2</sup>]</b> | pre  | 213.1 ± 49.5      | 174.1 ± 52.2      | 188.9 ± 59.3      |                                       |                                    |
|                                      | post | 205.8 ± 48.9 ***  | 168.4 ± 51.2 **   | 186.2 ± 57.6      | .256                                  | .098                               |
|                                      | [d]  | -3.4 ± 4.6        | -3.0 ± 6.0        | -0.7 ± 8.8        |                                       |                                    |
| <b>Metabolic variables</b>           |      |                   |                   |                   |                                       |                                    |
| <b>Glucose [mg/dl]</b>               | pre  | 108.3 ± 34.5      | 107.4 ± 19.9      | 108.7 ± 23.5      |                                       |                                    |
|                                      | post | 102.5 ± 20.6 **   | 105.4 ± 19.1      | 100.7 ± 16.9 *    | .208                                  | .171                               |
|                                      | [d]  | -5.8 ± 17.6       | -2.0 ± 16.4       | -8.0 ± 16.9       |                                       |                                    |
| <b>Cholesterol [mg/dl]</b>           | pre  | 192.7 ± 62.5      | 191.0 ± 48.1      | 184.6 ± 44.5      |                                       |                                    |
|                                      | post | 182.6 ± 55.6      | 158.1 ± 32.2 ***  | 163.2 ± 47.0 ***  | .021                                  | .583                               |
|                                      | [d]  | -10.1 ± 44.1      | -32.9 ± 34.3      | -21.3 ± 23.4      |                                       |                                    |
| <b>Hemoglobin [g/dl]</b>             | pre  | 14.3 ± 1.1        | 14.5 ± 1.5        | 14.2 ± 1.2        |                                       |                                    |
|                                      | post | 14.5 ± 1.3        | 14.3 ± 1.4        | 14.2 ± 1.1        | .207                                  | .852                               |
|                                      | [d]  | 0.2 ± 0.6         | -0.2 ± 1.0        | 0.0 ± 0.6         |                                       |                                    |
| <b>Uric acid [mg/dl]</b>             | pre  | 6.26 ± 1.98       | 6.91 ± 1.30       | 6.91 ± 2.32       |                                       |                                    |
|                                      | post | 6.21 ± 1.95       | 6.51 ± 1.78       | 6.56 ± 1.61       | .765                                  | .792                               |
|                                      | [d]  | -0.05 ± 0.60      | -0.40 ± 1.11      | -0.35 ± 1.6       |                                       |                                    |

Data are presented as mean ± SD and percent [%] or absolute [d] change; p-values were calculated using change scores and ANCOVA with baseline values as covariate for between-group comparison or by paired t-test for within-group comparison. \*\*\*: *p*<.001; \*\*: *p*<.01; \*: *p*<.05; WB-EMS: whole-body electromyostimulation; PB-EMS: part-body electromyostimulation; BMI: body mass index.

**Supplemental table 3: Pre- to post-intervention changes of individual SF-36 categories**

|                             |      | <b>WB-EMS<br/>(n=47)</b> | <b>PB-EMS<br/>(n=37)</b> | <b>Control<br/>(n=38)</b> | <b>3-group<br/>comparison<br/>(<i>p</i>)</b> | <b>EMS vs.<br/>Control<br/>(<i>p</i>)</b> |
|-----------------------------|------|--------------------------|--------------------------|---------------------------|--|---|
| <b>SF-36 categories</b>     |      |                          |                          |                           |  |   |
| <b>Physical functioning</b> | pre  | 51.8 ± 61.5              | 48.9 ± 25.2              | 47.0 ± 26.1               |  |   |
|                             | post | 61.5 ± 26.8 **           | 56.6 ± 25.3              | 56.6 ± 25.6 **            | .808   | .950                                      |
|                             | [d]  | 9.7 ± 20.1               | 7.7 ± 22.5               | 9.6 ± 19.3                |  |   |
| <b>Role physical</b>        | pre  | 27.7 ± 36.2              | 20.7 ± 35.1              | 22.3 ± 31.1               |  |   |
|                             | post | 46.7 ± 39.7 **           | 45.1 ± 44.1 **           | 36.5 ± 38.0 *             | .526   | .261                                      |
|                             | [d]  | 18.9 ± 43.7              | 24.4 ± 42.3              | 14.2 ± 41.9               |  |   |
| <b>Role emotional</b>       | pre  | 45.9 ± 44.0              | 40.0 ± 45.6              | 38.1 ± 45.0               |  |   |
|                             | post | 60.0 ± 46.4 *            | 61.0 ± 45.4              | 52.3 ± 42.7               | .715   | .463                                      |
|                             | [d]  | 14.1 ± 40.5              | 21.0 ± 61.1              | 14.2 ± 44.3               |  |   |
| <b>Vitality</b>             | pre  | 35.1 ± 15.3              | 35.9 ± 20.2              | 34.9 ± 18.7               |  |   |
|                             | post | 47.3 ± 19.8 ***          | 48.0 ± 21.0 ***          | 45.4 ± 19.1 ***           | .848   | .567                                      |
|                             | [d]  | 12.2 ± 17.7              | 12.1 ± 17.8              | 10.5 ± 16.3               |  |   |
| <b>Mental health</b>        | pre  | 43.7 ± 14.6              | 48.8 ± 18.2              | 45.5 ± 17.1               |  |   |
|                             | post | 47.0 ± 15.6              | 43.7 ± 14.9              | 49.6 ± 19.3               | .238   | .209                                      |
|                             | [d]  | 3.3 ± 19.7               | -5.1 ± 22.1              | 4.1 ± 22.3                |  |   |
| <b>Social functioning</b>   | pre  | 65.8 ± 28.1              | 64.9 ± 28.2              | 58.7 ± 27.1               |  |   |
|                             | post | 75.6 ± 24.0 *            | 70.0 ± 27.8              | 67.9 ± 28.0 *             | .551   | .732                                      |
|                             | [d]  | 9.7 ± 24.6               | 5.1 ± 24.0               | 9.2 ± 25.8                |  |   |
| <b>Bodily pain</b>          | pre  | 42.3 ± 29.6              | 43.4 ± 26.8              | 46.0 ± 32.1               |  |   |
|                             | post | 57.4 ± 25.5 ***          | 51.5 ± 21.9 *            | 53.0 ± 28.7               | .253   | .385                                      |
|                             | [d]  | 15.1 ± 23.9              | 8.1 ± 22.7               | 7.0 ± 27.4                |  |   |
| <b>General health</b>       | pre  | 42.7 ± 17.6              | 45.7 ± 14.3              | 40.0 ± 17.9               |  |   |
|                             | post | 50.5 ± 18.9 **           | 46.7 ± 20.3              | 45.8 ± 21.8               | .331   | .884                                      |
|                             | [d]  | 7.9 ± 15.9               | 1.0 ± 20.9               | 5.8 ± 17.9                |  |   |

Data are presented as mean ± SD and absolute [d] change; p-values were calculated using change scores and ANCOVA with baseline values as covariate for between-group comparison or by paired t-test for within-group comparison. \*\*\*:  $p < .001$ ; \*\*:  $p < .01$ ; \*:  $p < .05$ ; WB-EMS: whole-body electromyostimulation; PB-EMS: part-body electromyostimulation.

**Supplemental table 4: Baseline and intervention differences by sex and indication for rehabilitation**

| Sex                                |      | Male<br>(n=91)        |                   | Female<br>(n=31)      |                   | Group<br>(p) | Group<br>×<br>Sex<br>(p)            |
|------------------------------------|------|-----------------------|-------------------|-----------------------|-------------------|--------------|-------------------------------------|
|                                    |      | EMS (WB+PB)<br>(n=61) | CG<br>(n=30)      | EMS (WB+PB)<br>(n=23) | CG<br>(n=8)       |              |                                     |
| Chair Rise Test<br>(repetition, n) | pre  | 5 (5; 7)              | 6 (4; 7)          | 5 (4; 7)              | 6 (3; 7)          | .101         | -                                   |
|                                    | post | 7 (6; 8) ***          | 7 (5; 8)          | 7 (5; 8) ***          | 7 (4; 7)          | -            | .746                                |
|                                    | [%]  | 25.2 ± 22.6           | 12.6 ± 23.8       | 35.3 ± 32.9           | 14.2 ± 19.5       |              |                                     |
| 6MWT<br>(m)                        | pre  | 524.8 ± 97.0          | 497.2 ± 94.2      | 453.5 ± 92.1          | 505.8 ± 100.7     | .734         | -                                   |
|                                    | post | 572.2 ± 85.9 ***      | 532.7 ± 83.5 ***  | 506.0 ± 107.3 ***     | 518.6 ± 107.3     | -            | .369                                |
|                                    | [%]  | 10.4 ± 11.2           | 8.4 ± 9.7         | 11.3 ± 6.2            | 3.0 ± 8.4         |              |                                     |
| Knee extension<br>(N)              | pre  | 767.2 ± 230.9         | 679.6 ± 231.6     | 478.3 ± 170.9         | 484.5 ± 200.0     | .683         | -                                   |
|                                    | post | 903.2 ± 256.1 ***     | 742.7 ± 204.9 **  | 575.5 ± 217.6 ***     | 555.4 ± 216.7 **  | -            | .333                                |
|                                    | [%]  | 22.0 ± 30.2           | 13.0 ± 20.4       | 22.6 ± 19.6           | 17.3 ± 13.3       |              |                                     |
| Indication                         |      | Cardiac<br>(n=73)     |                   | Orthopedic<br>(n=49)  |                   | Group<br>(p) | Group<br>×<br>Indicati<br>on<br>(p) |
|                                    |      | EMS (WB+PB)<br>(n=52) | CG<br>(n=21)      | EMS (WB+PB)<br>(n=32) | CG<br>(n=17)      |              |                                     |
| Chair Rise Test<br>(repetition, n) | pre  | 5 (5; 7)              | 6 (5; 8)          | 5 (4; 7)              | 5 (4; 7)          | .883         | -                                   |
|                                    | post | 7 (6; 8) ***          | 7 (6; 8) ***      | 7 (5; 9) ***          | 6 (5; 7) ***      | -            | .232                                |
|                                    | [%]  | 28.6 ± 23.4           | 9.5 ± 22.0        | 27.2 ± 30.1           | 17.2 ± 23.6       |              |                                     |
| 6MWT<br>(m)                        | pre  | 498.6 ± 111.0         | 499.4 ± 100.0     | 514.0 ± 80.8          | 499.0 ± 90.7      | .657         | -                                   |
|                                    | post | 542.3 ± 104.4 ***     | 527.9 ± 83.7 ***  | 571.5 ± 80.5 ***      | 531.1 ± 95.5 ***  | -            | .447                                |
|                                    | [%]  | 10.0 ± 10.3           | 7.3 ± 10.6        | 11.8 ± 9.6            | 6.9 ± 8.5         |              |                                     |
| Knee extension<br>(N)              | pre  | 715.5 ± 264.8         | 711.8 ± 254.6     | 643.6 ± 224.3         | 548.1 ± 181.6     | .786.        | -                                   |
|                                    | post | 831.1 ± 285.6 ***     | 772.7 ± 214.7 *** | 784.8 ± 282.1 ***     | 617.5 ± 196.7 *** | -            | .682                                |
|                                    | [%]  | 21.4 ± 30.2           | 13.1 ± 22.1       | 23.3 ± 23.0           | 15.0 ± 15.1       |              |                                     |

Data are presented as mean ± SD or median (inter quartile range) and percent change; p-values were calculated using change scores and ANCOVA with baseline values and sex or indication as covariate for between-group comparison or by paired t-test for within-group comparison. \*\*\*: p<.001; \*\*: p<.01; \*: p<.05; 6MWT: 6-Minute Walking Test; EMS [WB+PB]: electromyostimulation group.



**Supplemental Figure 1: EMS equipment (miha bodytec); electrode vest and cuffs used in EMS training.**